



# **WORK PLAN FOR THE MAIN SITE RISK ASSESSMENT**

*Associated with the*

## **ENGINEERING EVALUATION AND COST ANALYSIS OF THE FORMER CELOTEX SITE**

**2800 South Sacramento Avenue  
Chicago, Illinois 60623**

*Prepared for:*

**ALLIEDSIGNAL, INC.  
MORRISTOWN, NEW JERSEY  
and  
THE CELOTEX CORPORATION  
TAMPA, FLORIDA**

**DECEMBER 1997**

*Prepared by:*

**PARSONS ENGINEERING SCIENCE, INC.  
1000 JORIE BOULEVARD, SUITE 250  
OAK BROOK, ILLINOIS 60523**

Parsons ES Project No. 730577

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## SECTION 1 INTRODUCTION

### 1.1 PROJECT OVERVIEW

On 1 November 1996, the United States Environmental Protection Agency (USEPA) entered into an Administrative Order by Consent (AOC) with the Participating Respondents AlliedSignal, Inc. and The Celotex Corporation, for the property located at 2800 South Sacramento Avenue in Chicago, Illinois (the Site). The AOC stipulates that an Engineering Evaluation and Cost Analysis (EE/CA) would be performed for the Site. Included as a part of the AOC was the EE/CA Scope of Work (SOW), which outlined the project-specific activities that were required for the completion of the EE/CA.

Parsons Engineering Science, Inc. (Parsons ES) has been retained by the Respondents, through a contract with AlliedSignal, Inc. to provide the engineering services necessary to complete the EE/CA for the Site. Section IV of the EE/CA SOW stipulates that a risk assessment be conducted for the Site. This work plan presents the conceptual approach that will be followed by the Parsons ES risk assessment specialists during the course of preparing the risk assessment for the Site.

It is to be noted that for clarification purposes the following terminology will be used as described below:

- "The Site" refers to the 24 acres of property located at 2800 South Sacramento Avenue, of which approximately 18 acres of the property is owned by The Celotex Corporation, and a 6-acre parcel to the south is owned by Palumbo Corporation et al.
- The risk assessment discussed in this work plan refers to the Main Site Risk Assessment.
- References within this work plan (or within the Main Site Risk Assessment Report) to the "main site" or to "on-site" refer to the area within the boundaries of the Site that encompasses the 24-acre property described previously.
- Within this document (or within the Main Site Risk Assessment Report), potentially impacted residential areas may also be referred to as "off-site areas."

This work plan consists of Section 1, the introduction, and Section 2, the risk assessment conceptual strategy.

## SECTION 2

### RISK ASSESSMENT CONCEPTUAL STRATEGY

#### 2.1 OVERVIEW

In the AOC, the provisions covering the human health risk assessment include the following language:

*"The Respondents shall conduct a risk assessment in accordance with the procedures defined in the "Risk Assessment for Superfund, Volume 1, Human Health Evaluation Manual", EPA/540/1-89-002 to assess any risks or potential risks from contamination on the Site or that may have been caused by the Site. For on-site contamination, the risk assessment shall evaluate the risks from future development of the Site. Respondents may propose cleanup objectives and cleanup action levels for each media of concern. U.S. EPA will develop cleanup objectives and cleanup action levels and cleanup objectives will be provided to the Respondents. These cleanup objectives and cleanup action levels may apply to groundwater, sediments, source control and other media."*

Accordingly, the risk assessment approach outlined herein will focus on an assessment of the impacts to human health for current and reasonably anticipated future uses of the Site. Since the AOC specifies only an evaluation of human health concerns, and given the highly urban nature of the area in which the Site is situated, an ecological evaluation for the Site will not be performed.

The risk assessment process conducted by Parsons ES for the main site will consist of six primary subtasks: (1) Data Evaluation, (2) Exposure Assessment, (3) Toxicity Assessment, (4) Risk Characterization, (5) Uncertainty Analysis, and (6) Calculation of Cleanup Goals. The details of these subtasks are described in the following subsections.

## **2.2 DATA EVALUATION**

### **2.2.1 Gather/Analyze Site Data**

The first step in the data evaluation stage of the risk assessment process will be the evaluation of the data set for the Site. The main site investigation was performed during the period of 29 April through 6 June 1997. On 20 October 1997, Parsons ES submitted the Data Report associated with the main site field investigation to the United States Environmental Protection Agency (USEPA) Region V for review and comment. In a letter dated 20 November 1997 from the USEPA Remedial Project Manager (RPM) Mr. Thomas Williams, P.E., the USEPA stated their approval of the Data Report. The investigation of the main site provided data on the hazardous constituents present in site-related environmental media, e.g., soils and groundwater, and provided information on the geologic properties of Site soils. This risk assessment will be conducted based primarily on the data generated from the main site investigation, as presented in the USEPA-approved October 1997 Data Report.

Analytical data related to on-site hazardous constituent levels also exist from soil sampling activities performed by the Illinois Environmental Protection Agency (IEPA) during a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) screening site inspection in January 1991, and from a preliminary surface soil investigation performed by ERM-North Central, Inc. in October 1995. Since these data were not generated as part of the main site investigation or validated as part of the Parsons ES October 1997 Data Report, the compatibility of these data with the data presented in the Data Report, and the usability of these data in the main site risk assessment, will have to be evaluated by the Parsons ES risk assessment specialists as part of the data assessment process. However, it should be noted that the data set generated from the main site investigation provides extensive analytical data on shallow surface soils at the Site. The use of this data should be adequate if the IEPA and ERM data sets are deemed unacceptable for inclusion in the risk assessment process.

Several sediment samples were collected from the Chicago Sanitary and Ship Canal, which is located approximately 1,500 feet south of the Site. As previously discussed and agreed to by the Respondents and the USEPA Region V RPM, these sediment data were collected primarily for informational purposes, and will not be included in or assessed as part of the data set for main site risk assessment.

In the October 1997 Data Report, it was stated that resurfacing/recontouring work and drainage installation activities performed at the Site in June-July 1997 to address surface water run-off issues completely altered site/soil conditions in approximately the upper 6 feet of the Site (and deeper in a few areas). This has resulted in elevation changes in various areas of the Site; therefore, the depths of some of the samples collected during the April-June 1997 main site sampling event do not correlate with current Site elevations. Based on direction from the USEPA Region V RPM, the risk assessment (and other reports) generated as part of the EE/CA will be based on Site conditions as they originally existed before the Site was reworked in June-July 1997.

#### **2.2.2 Select Chemicals of Potential Concern**

The second step within the data evaluation process is the selection of chemicals of potential concern (COPCs). To this end, the chemical constituents detected in on-site media will be screened to identify those constituents that should be quantitatively evaluated in the risk assessment process. In accordance with USEPA Region V guidance, screening criteria that may be employed in this process include (1) a comparison to USEPA Soil Screening Levels, (2) analysis of frequency of detection, (3) comparison to background, and (4) evaluation of essential nutrients.

### **2.3 EXPOSURE ASSESSMENT**

#### **2.3.1 Characterization of the Exposure Setting**

An evaluation of the physical environment of the Site and surrounding properties will be undertaken, including the general physical characteristics such as climate, vegetation, groundwater hydrology, and the presence and location of surface water. In addition,

populations will be identified and described with respect to those characteristics that influence exposure, such as location relative to the Site, activity patterns, and the presence of sensitive subpopulations, e.g., children. This process will be performed for both current and reasonably anticipated future populations that may be exposed to Site contaminants. The result of this step will be a conceptual site model (CSM).

### **2.3.2 Identification of Exposure Pathways**

This step identifies those pathways by which the identified populations may be exposed. Each exposure pathway will describe the mechanism by which a population may be exposed to the chemicals at or originating from the Site. The exposure pathways will be identified based on consideration of the sources, releases, types, and locations of the chemicals at the Site; the likely environmental fate and transport of these chemicals; and the locations of the potentially exposed populations. Exposure points and routes of exposure will be identified for each exposure pathway.

It is anticipated that the pathway scenarios presented below may be evaluated in the main site risk assessment. A final list of complete exposure pathway scenarios will be developed after an actual evaluation of Site conditions is performed.

#### ***CURRENT SITE EXPOSURE SCENARIO***

##### **Scenario 1 - Site Remains Unused in Current Status**

- **On-site worker:** Ingestion of surface soil, dermal contact with surface soil, inhalation of volatiles and particulates arising from surface soil.
- **Site trespasser:** Ingestion of surface soil, dermal contact with surface soil, inhalation of volatiles and particulates arising from surface soil.

#### ***REASONABLY ANTICIPATED FUTURE USE EXPOSURE SCENARIOS***

##### **Scenario 1 - Continued Industrial Land Use**

- **On-site Worker:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil, and ingestion of groundwater

- **Future Trespasser:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.
- **Construction Worker:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.

### **Scenario 2 - Land Use as a Park**

- **On-Site Worker:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.
- **Park Patron/Adult:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.
- **Park Patron/Child:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.
- **Construction Worker:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.

### **Scenario 3 - Residential Land Use**

- **Combined Adult/Child Resident:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil, ingestion of groundwater, dermal contact with groundwater, inhalation of volatiles from groundwater.
- **Construction Worker:** Ingestion of mixed surface and subsurface soil, dermal contact with mixed surface and subsurface soil, inhalation of volatiles and particulates arising from mixed surface and subsurface soil.

#### **2.3.3 Quantification of Exposure**

This step will quantify the magnitude, frequency, and duration of exposure for each completed pathway identified in the CSM. The quantification will include (1) an estimation of exposure point concentrations [EPCs], (2) the identification of appropriate exposure parameter values for each type of receptor, followed by (3) a calculation of chemical intakes for the potentially exposed populations. The determination of EPCs may take into

consideration the spatial and temporal nature of the contaminants; e.g., derivation of EPCs that include and eliminate hot spots, concentrations based on fate and transport modeling, etc. Intakes will be determined for both the central tendency (CT) case as well as the reasonable maximum exposed (RME) case. If the deterministic risk evaluation indicates that an unacceptable risk is present for a receptor, a more site-specific evaluation (including the use of probabilistic techniques) may be used to refine the estimation of the risk, if deemed necessary.

## **2.4 TOXICITY ASSESSMENT**

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for particular contaminants to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects. The steps included in the toxicity evaluation include:

- Gathering of toxicity information for substances being evaluated
- Identification of exposure periods for which toxicity values are necessary
- Determination of toxicity values for carcinogenic and noncarcinogenic effects; i.e., carcinogenic slope factors (SFs) for carcinogens and reference doses (RfDs) for noncarcinogens
- Summarization of the toxicity information

Toxicity information will be obtained from the following sources in the order given:

1. USEPA Integrated Risk Information System (IRIS)
2. USEPA Health Effects Assessment Summary Tables (HEAST)
3. USEPA provisional and withdrawn values
4. Peer reviewed scientific literature

## **2.5 RISK CHARACTERIZATION**

The risk characterization step will integrate the toxicity and exposure assessment outputs into quantitative expressions of risk. Specifically, the carcinogenic risk and

noncarcinogenic hazard (given by the hazard quotient [HQ]) posed by a given chemical to a given receptor in a given exposure pathway is calculated by the following equations:

**Risk = (I)(SF), where**

Risk is the risk posed by the chemical through the pathway.

I is the intake of the chemical through the pathway.

SF is the cancer slope factor for the chemical by that pathway.

**HQ = I/RfD, where**

HQ is the hazard posed by the chemical through the pathway.

I is the intake of the chemical through the pathway.

RfD is the reference dose for the chemical by that pathway.

The total pathway-specific risk or hazard for the receptor will be derived by adding all the risks or hazards for all the chemicals in that pathway. The total carcinogenic risk or hazard for a receptor across all media and pathways will be derived by adding all the pathway-specific risks or hazards. (Note: The sum of the HQs is referred to as a hazard index [HI]. When chemical-specific HQs in a pathway are added, the result is a pathway-specific HI. When all pathway-specific HIs are added for a receptor, the result is a total HI for the receptor.)

The risk characterization results will be summarized in tables, and a comparison of the derived total risks and hazards to established risk management paradigms will be performed. Total cancer risks will be compared to the carcinogenic risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ , and total noncarcinogenic hazards will be compared to a HI of 1. If a receptor has a total carcinogenic risk that exceeds  $1 \times 10^{-4}$  or total noncarcinogenic hazard that exceeds a HI of 1, a preliminary list of chemicals of concern (COCs) will be developed for that receptor as follows:

1. Each carcinogenic chemical in a pathway that exceeds a risk of  $1 \times 10^{-6}$  will be selected as a preliminary chemical of concern for the medium associated with that pathway.

2. Each noncarcinogenic chemical in a pathway that exceeds a HQ of 0.1 will be selected as a preliminary chemical of concern for the medium associated with that pathway.
3. If the level of a chemical in a given medium exceeds a state or federal chemical-specific applicable or relevant and appropriate requirement (ARAR), that chemical will also be included as a preliminary chemical of concern for that medium.

## 2.6 UNCERTAINTY ANALYSIS

The quantitative measures of risk that will be derived in this evaluation are conditional estimates based on a considerable number of assumptions about exposure and toxicity, e.g., risk given a particular future land use. This section will evaluate the assumptions and uncertainties inherent in the risk assessment, to place the risk estimates in proper perspective. This section will also include an evaluation of the uncertainties associated with the preliminary chemicals of concern to determine a list of final COCs. Another use of the uncertainty characterization will be to identify areas where a moderate amount of additional data collection might significantly improve the basis for selection of a remedial alternative, as well as the uncertainty associated with any identified hot spots and their use in evaluating risks.

## 2.7 CALCULATION OF CLEANUP GOALS

Cleanup levels will be determined for each of the final COCs that remains after the uncertainty analysis described previously in Section 2.6 has been completed. The derivation of cleanup values is most often performed by the following steps:

### For Each Receptor:

- **Step 1.** A risk or HQ equation for each medium, that takes all pathways associated with that medium into account, will be written out. For example, if a current worker is exposed to surface soil by ingestion, dermal contact, and inhalation of particulates and volatiles (the three pathways arising from surface soil), the risk

posed by a carcinogenic soil COC through all three of these pathways would be given by:

$$\text{Risk} = (I_o)SF_o + (I_d)SF_d + (I_i)SF_i, \text{ where}$$

$I_o$  is the oral intake of surface soil.

$SF_o$  is the oral slope factor.

$I_d$  is the dermal intake from surface soil.

$SF_d$  is the dermal slope factor.

$I_i$  is the inhalation intake of volatiles and particulates arising from surface soil.

$SF_i$  is the inhalation slope factor.

A similar equation can be written for the HQ posed by a noncarcinogenic soil COC through these three pathways.

- **Step 2.** Rearrange the equation in Step 1 to solve for the medium concentration.
- **Step 3.** Using this rearranged equation, calculate a cleanup value for each of the final COCs identified for the medium at a specified level of risk or hazard.

To provide flexibility in the risk management process, Parsons ES proposes that cleanup values for carcinogens be calculated at risk levels of  $1 \times 10^{-4}$ ,  $1 \times 10^{-5}$ , and  $1 \times 10^{-6}$ ; and that noncarcinogens be calculated at HQs of 0.1, 1.0, and 3.0. The resulting cleanup value for a chemical in a specific medium (e.g., benzo(a)pyrene in soil; benzene in groundwater) for a specific receptor (e.g., child, adult, worker) will be the lower of the cancer or noncancer value. The overall cleanup value for a chemical in a specific medium will be the lowest value among the various receptors exposed to that medium. This information will be presented in tabular form to clearly show the logic in developing the proposed cleanup levels along with identified ARARs.